

**Notice of Allowability**

Application No.

09/448,578

Examiner

Jyoti Chawla

Applicant(s)

HUIGE ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to RCE.
2. ☒ The allowed claim(s) is/are 1,2,4-6 and 10-12.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☒ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |  |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment                    |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material          | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance   |
|   | 9. <input type="checkbox"/> Other _____.   |

## **REASONS FOR ALLOWANCE**

### ***Continued Examination Under CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 15, 2006 has been entered.

### **Drawings**

This application has been filed with informal drawings, which were acceptable for examination purposes only. Formal drawings will be required since the application has been deemed allowable.

***Examiner's Amendment***

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Anne Rabe on October 26, 2006.

Please amend claim 1 to read as follows:

1. A method of fermenting a liquid medium with a yeast slurry from a previous fermentation, the method comprising the steps of:
  - (a) providing an undiluted yeast slurry from a previous fermentation having 40 g/1 yeast to 80 g/1 yeast on a dry weight basis, wherein the yeast experienced anaerobic conditions in the previous fermentation;
  - (b) passing at least a portion of the yeast slurry through a membrane contactor, the contactor comprising at least one hydrophobic, microporous membrane, the membrane having a liquid side and a gas side, wherein the contactor is connected to an oxygen source, and wherein at least a portion of the yeast slurry is in proximity to the membrane on the liquid side;
  - (c) delivering oxygen from the oxygen source to the gas side of the membrane under conditions that cause at least a portion of the oxygen to transfer from the gas side of the membrane to the yeast slurry such that the  $k_La$  is at least  $0.005 \text{ sec}^{-1}$  and wherein said transfer of oxygen to the yeast slurry is bubble-free;
  - (d) determining an oxygen uptake rate of the yeast slurry;
  - (e) increasing an oxygen delivery pressure on the gas side of the membrane and increasing a liquid pressure on the liquid side of the membrane in dependence on the oxygen uptake rate wherein the liquid pressure on the liquid side of the membrane is kept higher than the oxygen delivery pressure on the gas side of the membrane; and
  - (f) thereafter pitching a liquid medium with the yeast slurry.

***Reasons for Allowance***

The following is an examiner's statement of reasons for allowance:

Methods of oxygenation of yeast slurry have been known in the art. Quain et al., of record provide a method of brewing beer in which they aerate yeast from previous fermentation by causing a relatively large volume of yeast to circulate through a circuit where oxygen is being introduced through a cell of relatively small volume using sterile filter (metal) and glass sinter. Quain however, does not teach aeration of undiluted yeast slurry, using a polymeric hydrophobic microporous membrane filter such that the transfer of oxygen to the slurry is bubble-free. Masschelein, also of record, teaches aeration of yeast in a closed circuit with a porous rod made of aluminum oxide and sintered silicon carbide which is not a polymeric filter and would require a very large filter rod to oxygenate the slurry at the rate claimed in the instant invention. Other references of record, Dean et al and Ripka et al., ~~also of record~~, teach processes of continuous propagation of microbes in a bioreactor, however they also have problems of frothing or bubbling during aeration or oxygenation of the slurry. Bubbling or frothing of the yeast slurry is undesirable and makes the subsequent fermentation results inconsistent and unpredictable.

There was no specific suggestion or motivation in the prior art to show that any other method of aeration of undiluted yeast slurry obtained from a previous fermentation using a filter that suggested a bubble free transfer of oxygen from gas to the slurry side such that the  $k_L a$  is at least 0.005 to 0.1 per second. The closest prior art is focused on different ways to aerate or oxygenate the yeast or other microbial cultures, where the process proceeded slower, with different equipment and had formation of bubbles in the resulting slurry.

Thus one of ordinary skill in the art would not have expected, nor could have predicted, the unexpected results of using the polymeric, hydrophobic microporous

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membrane filter under pressure would deliver oxygen to the undiluted yeast slurry and not cause bubbling or frothing as experienced by the closest prior art. Thus the oxygenation of yeast slurry using the polymeric hydrophobic microporous membrane filter with the oxygen transfer rate constant  $k_La$  is at least 0.005 to 0.1 per second in the instantly claimed invention is free of the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jyoti Chawla whose telephone number is (571) 272-8212. The examiner can normally be reached on 8:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Milton Cano can be reached on (571) 272-1398. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



**KEITH HENDRICKS**  
PRIMARY EXAMINER

Jyoti Chawla  
Examiner  
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